

Technical Documentation, Data Sources, and Methods for Analyzing the Impacts of the January 2025 Wildfires on Businesses

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Introduction

This technical document describes the data sources, methods, and key decisions that informed our analysis of the January 2025 wildfires' impact on businesses in Altadena and Pacific Palisades. The analysis consists of three components: (1) baseline profiles of businesses before the fires; (2) the extent of fire-related damage; and (3) the status of businesses six months after the fires.

We draw on multiple data sources to carry out these analyses and use triangulation (cross-verifying results across multiple data sources) to assess the consistency and robustness of our findings. The appendix begins by defining the study areas, followed by an overview of the core datasets. It then describes how business and structural data were geocoded and spatially joined. The methods used to assess fire damage, estimate the race and ethnicity of business owners, and determine post-fire business status are also explained. Finally, we outline key limitations and adjustments made during the analysis. While three major business directories are used, one serves as the primary source for more detailed and disaggregated findings.

Defining the Study Area

Our analysis focuses on businesses located both inside and outside the wildfire perimeter. “Inside” and “Outside” refer to a business’s location relative to the fire perimeter, within the broader study areas defined below. Businesses outside the perimeter may still experience indirect effects, including being located in evacuation zones or suffering economic impacts due to the displacement of customers.

We defined our study areas based on two ZIP codes: **91001 for Altadena** and **90272 for Pacific Palisades**. These two ZIP Codes were selected because they were at the core of the areas impacted by the January 2025 wildfires, capturing a large majority of fire-affected structures within each community.

- **Altadena:** While ZIP code 91001 does not perfectly align with the official Census-Designated Place (CDP) boundary for Altadena, it covers nearly all of the community. The main exception is a small portion in the southeast, which falls outside the ZIP code. This slight difference is illustrated in Map 2.
- **Pacific Palisades:** ZIP code 90272 closely aligns with the commonly accepted boundaries of the Pacific Palisades neighborhood in the City of Los Angeles. For reference, we display the Los Angeles Times Neighborhood Mapping Project boundary for Pacific Palisades, which is also shown in Map 2.

Using ZIP codes provides a more practical way to define neighborhood boundaries for data collection and analysis, particularly when working with business or administrative datasets that are not aligned with Census boundaries like CDPs.

ZIP Codes

ZIP Codes (Zone Improvement Plan Codes) are widely used units for organizing and collecting data. In this study, we use U.S. Postal Service (USPS) ZIP Codes because they more closely align with the structure of our source datasets, such as business directories, making them more practical for neighborhood-level analysis.

Originally created by the USPS to facilitate mail delivery, ZIP codes are not simple geographic areas but rather collections of delivery routes. As a result, their boundaries can be irregular and may change over time. Despite these limitations, ZIP Codes are commonly used in analysis because many administrative and commercial datasets are structured around them.

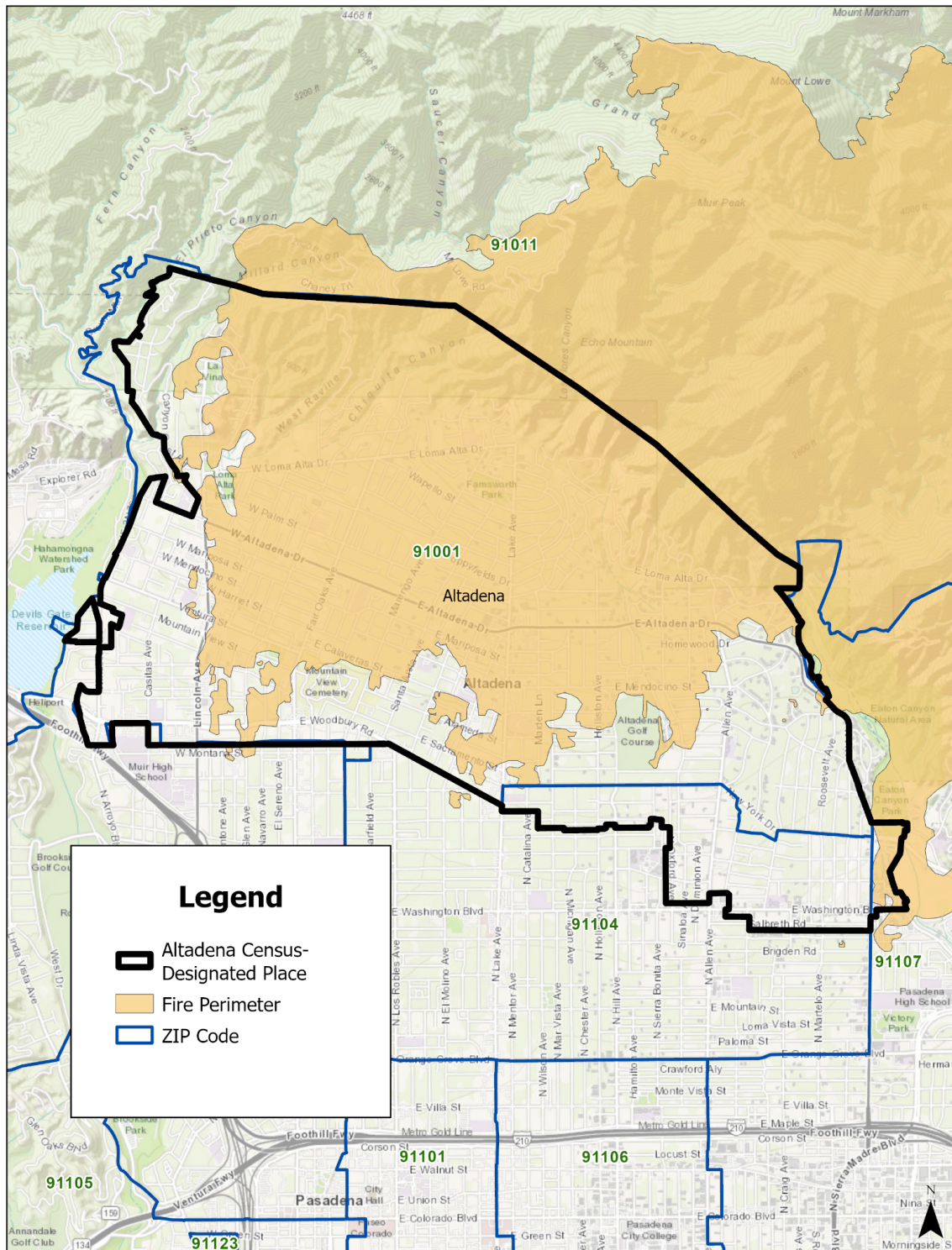
ZIP Codes, Census-Designated Place, and Fire Perimeter in Altadena

This map shows the geographic boundaries used in our analysis of Altadena, California. The blue outlines represent ZIP Code boundaries (sourced from an ESRI GIS shapefile), the black outline marks the official Altadena census-designated Place boundary as defined by the U.S. Census Bureau, and the orange area indicates the Eaton Fire perimeter.

Altadena is primarily covered by ZIP Code 91001, which closely aligns with both the CDP boundary and the area affected by the fire. Smaller portions of the Altadena CDP fall within ZIP Codes 91104 and 91107, which are shared with the neighboring City of Pasadena. Notably, the southern and southeastern corners of the Altadena CDP, located within 91104 and 91107, were not included in our analysis.

Although a small portion of the Altadena segment of ZIP Code 91107 falls within the fire perimeter, ZIP Code 91001 captures the vast majority of both the community and the impacted area. Of the approximately 18,000 structures assessed through Cal Fire's Damage Inspection (DINS) program, nearly 15,000 were located in ZIP Code 91001, accounting for four-fifths (80%) of all structures assessed within the Eaton Fire perimeter, regardless of damage level. This provides strong coverage for our ZIP Code-based analysis of the fire's impact on Altadena.

Map 1. ZIP Codes, Census-Designated Place, and Fire Perimeter in Altadena



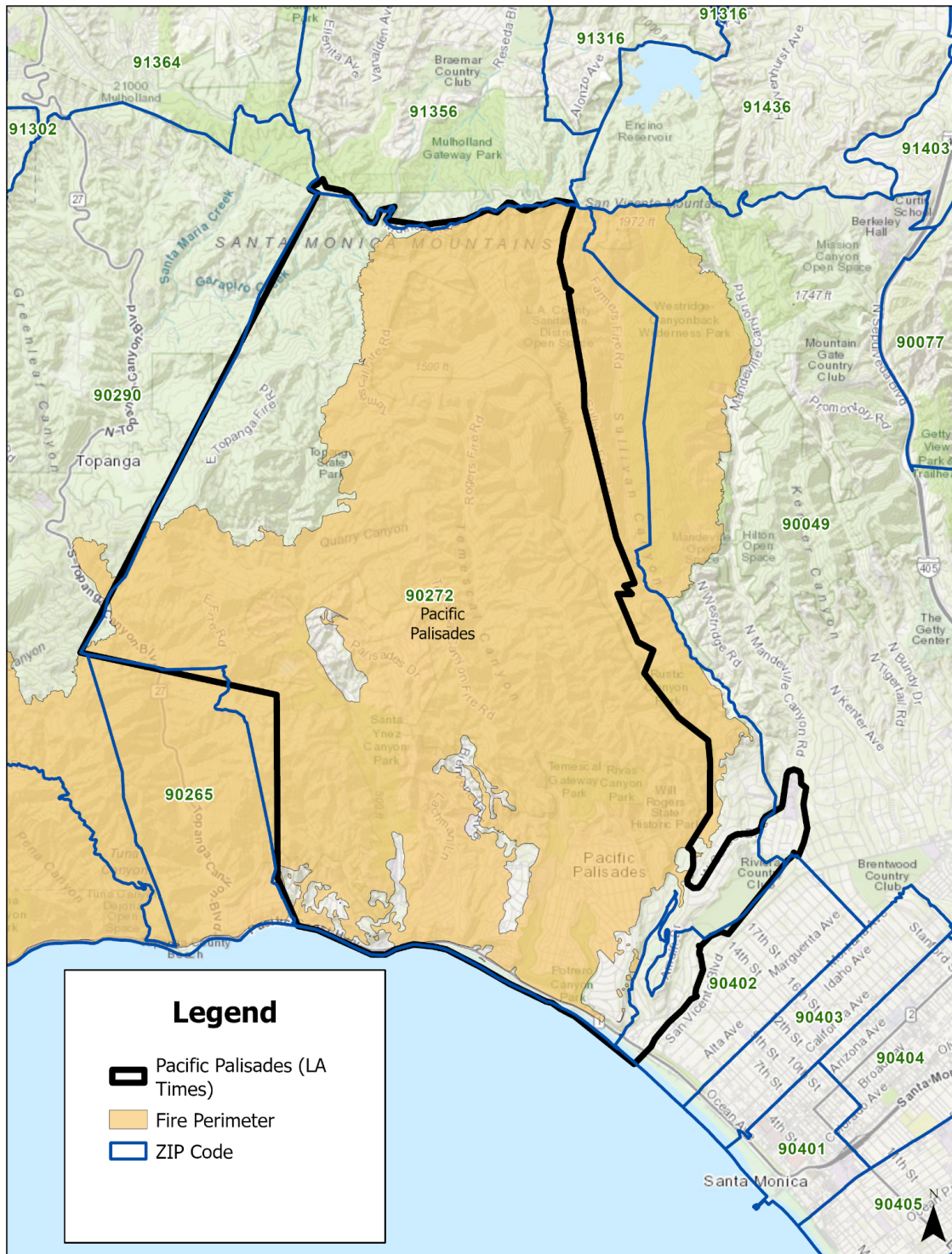
Sources: U.S. Census Bureau, *Cartographic Boundary Files* (2019); CAL FIRE (2025); Esri (2022).

ZIP Codes LA Times Neighborhood Boundary, and Fire Perimeter in Pacific Palisades

Map 2 shows the geographic boundaries used in our analysis of Pacific Palisades, a neighborhood within the City of Los Angeles. The blue outlines represent ZIP Code boundaries (based on an ESRI GIS shapefile), while the black outline reflects the Los Angeles Times-defined neighborhood boundary. The orange shaded area indicates the fire perimeter.

Pacific Palisades is almost entirely contained within ZIP Code 90272, making it a practical unit for analysis. Although ZIP Codes do not always align with neighborhood boundaries, in this case ZIP Code 90272 closely reflects both the recognized extent of Pacific Palisades and the area affected by the fire. Of the approximately 12,000 structures assessed through Cal Fire's DINS program for the Palisades Fire, over 9,000 were located within ZIP Code 90272, accounting for more than three-quarters of all assessed structures. For this reason, ZIP Code 90272 was selected as the study boundary for this neighborhood.

Map 1. ZIP Codes LA Times Neighborhood Boundary, and Fire Perimeter in Pacific Palisades



Sources: Los Angeles Times Neighborhood Boundaries (2019); CAL FIRE (2025); Esri (2022).

Scope of Analysis: Private Businesses

This study focuses exclusively on private businesses, excluding public agencies, nonprofit organizations, and government-owned parcels. The restriction ensures that the analytic sample reflects establishments operating in the private sector. While this approach may not perfectly capture all privately operated establishments, given occasional inconsistencies in NAICS and parcel ownership coding, it provides a consistent and reasonable basis for distinguishing private-sector activity across study areas. The steps used to define private businesses were applied consistently across study areas, with a small adjustment for Pacific Palisades due to the way schools were listed in the source data.

- Altadena (ZIP Code 91001):
Records were excluded if they met any of the following criteria:
 - Classified under NAICS 92 (*Public Administration*).
 - Classified under NAICS 813 (*Religious, Grantmaking, Civic, Professional, and Similar Organizations*).
 - Identified as government-owned parcels based on the Los Angeles County Assessor's *Use Code* variable (codes beginning with "88").
- Pacific Palisades (ZIP Code 90272):
The same restrictions applied as in Altadena, with one additional filter:
 - Records classified under NAICS 611 (*Educational Services*) that were also identified as government-owned parcels were excluded.

This adjustment was made because schools were categorized differently across the two sites. In Pacific Palisades, many schools appeared in the data under NAICS 611 but functionally operated as nonprofit or quasi-public institutions. To ensure comparability and focus on private sector establishments, these records were excluded.

These filters define the "private business" universe used in the analyses that follow. Unless otherwise noted, all references to "businesses" or "establishments" in this appendix refer to this restricted set.

Definition of Micro-Businesses

For this study, micro-businesses are defined as establishments with 1 to 9 employees, following the U.S. Small Business Administration's (SBA) definition.¹ These businesses represent the smallest employers and often have limited resources to absorb disruptions caused by disasters. The vast majority of establishments in our dataset fall into the micro-business category (at least seven in ten private businesses in each study area).

¹ Brian Headd. *The Role of Microbusiness Employers in the Economy*. U.S. Small Business Administration, Office of Advocacy, August 2017.
<https://advocacy.sba.gov/wp-content/uploads/2019/06/508FINALAug17Microbusiness.pdf>

We focus on micro-businesses in greater detail because they often face financial and structural disadvantages that make disaster recovery more difficult.² The challenges facing small businesses are well-documented, and it is reasonable to expect these disadvantages to hinder recovery from disasters like wildfires. These businesses typically encounter greater barriers to accessing aid and rebuilding compared to larger businesses.³ At the same time, micro-businesses play a vital role in local economies. Examining their wildfire impacts, along with the race and ethnicity of their owners and the types of industries they represent, helps reveal deeper inequities and vulnerabilities within affected communities.

Fire Perimeter Shapefile (CAL FIRE)

The fire perimeter shapefile used in this analysis was obtained from the California Department of Forestry and Fire Protection (CAL FIRE) through the California Natural Resources Agency's GIS data portal.⁴ This statewide GIS dataset includes the official boundaries of wildland fires from 1878 to the present, as reported by CAL FIRE and cooperating agencies such as the U.S. Forest Service, Bureau of Land Management, and National Park Service. Perimeters are submitted annually and include fires that meet minimum size or damage thresholds (e.g., ≥10 acres in timber, ≥50 acres in brush, ≥300 acres in grass, or ≥3 structures destroyed).

We filtered the shapefile to isolate the Eaton and Palisades fires that occurred in January 2025. The resulting fire perimeters were then used to spatially join with business location data from three different datasets (Dun & Bradstreet, Data Axle, and AtoZ) to identify which establishments were located inside or outside the fire perimeter. This spatial overlay enables an assessment of business impacts based on exposure to the fire event.

Los Angeles County Parcel Data (Secured Basic File Abstract)

We used the Secured Basic File Abstract from the Los Angeles County Assessor's Office, representing parcels as of December 1, 2024. This date captures conditions just prior to the January 2025 fires. The dataset includes detailed information for each parcel in the county, such as Assessor Identification Numbers, land and improvement values, zoning and use codes, ownership and mailing addresses, transfer dates, exemption

² Investopedia. "5 Ways Small Businesses Are at a Disadvantage."
<https://www.investopedia.com/articles/personal-finance/111315/5-ways-small-businesses-are-disadvantage.asp>

³ U.S. Chamber of Commerce. "The Biggest Challenges for Small Business Owners."
<https://www.uschamber.com/co/start/strategy/biggest-small-business-challenges>; Allen Fairview Chamber of Commerce. "9 Major Financial Challenges Small Business Owners Face."
<https://www.allenfairviewchamber.com/blog/9-major-financial-challenges-small-business-owners-face>

⁴ California Department of Forestry and Fire Protection (CAL FIRE). *California Fire Perimeters – All*. Accessed via California Natural Resources Agency GIS Data Portal:
<https://gis.data.cnra.ca.gov/datasets/CALFIRE-Forestry::california-fire-perimeters-all/about>

details, sales history, and building characteristics (e.g., year built, number of units, square footage).

We spatially joined the parcel data to the fire perimeter shapefiles to determine whether each parcel was located inside or outside the Eaton and Palisades fire boundaries. We also joined Cal Fire's Damage Inspection data to identify which parcels contained damaged or destroyed structures, including the severity of damage. This helped us assess the characteristics of affected properties, such as whether they were residential, commercial, or government-owned.

Data Triangulation Approach

This study integrates data from three business databases—*Data Axle*, *AtoZdatabases*, and *Dun & Bradstreet (D&B)*—to triangulate findings, as no single dataset offers complete and precise coverage. Each source varies in its coverage of the number, types, and reported characteristics of businesses.

Using ZIP Code 91001 as an illustrative case, the total number of businesses varies substantially across sources (includes all businesses, not limited to private establishments): D&B identifies 4,610 businesses, compared to 1,494 in AtoZ and 1,279 in Data Axle (see Table A-1). This wide range underscores fundamental differences in coverage and inclusion criteria among the datasets.

The differences are not limited to the number of establishments. There are discrepancies in the composition of the types of observations captured. For instance, businesses with only one employee make over half (53%) of D&B's listings, nearly one and a half times the share in AtoZ (38%) and more than double that in Data Axle (20%). Home-based businesses account for 55% of D&B's listings, well above the 32% in Data Axle and five times higher than AtoZ's 11%. Public or nonprofit entities, classified under NAICS codes 92 (Public Administration) or 813 (Religious, Grantmaking, Civic, Professional, and Similar Organizations), make up 10% of D&B's listings, compared to 8% in Data Axle and only 4% in AtoZ.

These variations suggest that D&B captures a broader range of micro-enterprises, solo operators, and home-based businesses, as well as more public and nonprofit entities. In contrast, AtoZ appears to identify a narrower set of businesses overall that have higher average revenues/sales, while Data Axle falls somewhere in between across most categories.

Table A-1. Comparison of Business Listings and Characteristics by Source in ZIP Code 91001 (Altadena)

	Data Axle		AtoZ		D&B	
	#	%	#	%	#	%
Total	1,279		1,494		4,610	
Home-based	404	32%	165	11%	2,534	55%
NAICS: 92 or 813	106	8%	59	4%	464	10%
1 employee	254	20%	75	5%	2,432	53%
Median sales	\$153,000		\$1.12 million		\$79,000	

Median sales or revenue figures reflect the most recent available data as of 2024, although the reference year may vary by source. Medians are calculated only for establishments that reported sales or revenue data.

In addition to differences in micro-business coverage, the databases also diverge in the number of large private-sector establishments. These establishments are important because they contribute disproportionately to the total number of jobs and sales or revenue reported in a community.

In Altadena (ZIP Code 91001), D&B lists roughly three times as many large establishments as AtoZ or Data Axle. A comparison of records across the datasets reveals several inconsistencies, both in inclusion and in reported values. For example, Business A, one of the area's largest establishments based on employment and revenue in Data Axle, does not appear at all in AtoZ or D&B. Even when an establishment appears in all three sources, key characteristics often vary significantly. Business B, a social services provider, is listed in all three datasets but with widely differing employee counts and revenue estimates. The highest reported employee count is nearly three times the lowest, and the highest reported revenue is more than one and a half times the lowest.

Classification also varies. Business C is categorized as a large firm in AtoZ but appears as a small operation in the other two sources. Business D, a residential facility, ranks among the top establishments in D&B only.

These inconsistencies are not limited to large establishments. Among 241 businesses listed in both AtoZ and Data Axle (matched by company name and location), discrepancies in reported values remain substantial. Of the 193 businesses with reported sales or revenue, the correlation coefficient (r) is just 0.135, suggesting a weak relationship. The low correlation appears to be influenced by outliers with high values and records with zero reported sales. When the sample is restricted to businesses with non-zero sales under \$2 million, the correlation increases to 0.362, explaining only 13

percent of the variance (r-squared, unadjusted for sample size). For the 222 businesses with reported employment figures, the correlation is stronger at 0.567. Excluding businesses with zero or more than 100 employees improves the correlation to 0.687, which accounts for 47 percent of the variance.

These results suggest two main conclusions. First, the reported values across the two datasets are significantly inconsistent. Second, employment appears to be a more reliable and consistent metric for classifying establishment size than sales or revenue. Based on this, our project uses number of employees to define the micro-business category.

The comparisons at both ends of the size scale illustrate that there are considerable differences in coverage and reported characteristics across the business datasets. Given this reality, it is useful to treat each as a different subsample of the true universe of establishments within a community. While there may be overlap, each source also captures unique aspects due to differing emphases and underlying data sources. These differences introduce inherent biases. A helpful analogy is how various stock market indices, such as the Dow Jones, S&P 500, and Nasdaq Composite, each track market performance in distinct but complementary ways.

Unfortunately, the specific biases in the three business establishment datasets are difficult to assess because the providers' methodologies are not well documented or readily accessible. Despite these limitations, the listings can still provide value. The key is to examine whether certain analytical patterns are consistent across sources. For example, if the percentage of micro-businesses damaged by wildfires is qualitatively similar across all three datasets, we can have greater confidence in the overall findings.

This variability underscores the importance of a triangulated approach, especially when evaluating local economic outcomes. By cross-referencing multiple sources, the analysis can better navigate discrepancies and assemble a more comprehensive picture of the business landscape.

Time Frame of Analysis

To ensure a more comprehensive analysis, we examined two time points: (1) a baseline period representing the month prior to the January 2025 wildfires (roughly December 2024), and (2) a follow-up period in July 2025, capturing active businesses several months post-fire. Due to known lags in reporting business closures, the July extraction allowed us to better identify which businesses were no longer listed as active.

Geocoding and Spatial Join Process

The project requires that we spatially join establishments to parcels, so identifying the precise location of businesses is critical. We use ArcGIS to geocode addresses to generate x/y (longitude and latitude) coordinates for spatial analysis. Although two datasets (AtoZ and D&B) already included coordinates, a comparison with the ArcGIS assignments indicates that the pre-existing information in the datasets are less reliable.

It is unclear which address geolocator those datasets used, and some of their coordinates were imprecise or placed businesses in incorrect locations.

Re-geocoding all addresses using a consistent software (ArcGIS) and its built-in address locator ensures uniformity across the datasets. This approach helps eliminate discrepancies that may arise from relying on unknown or inconsistent geocoding methods used by the original data providers.

Once geocoded by ArcGIS, each business was spatially joined to the wildfire perimeter to determine whether it was located within the fire affected area. We then performed a second spatial join to link each business to its corresponding parcel using Los Angeles County Assessor parcel shapefile.

Most records successfully joined to a parcel. However, several did not. In some cases, this was due to missing or incomplete address information. For records lacking a valid street address, ArcGIS defaulted to geocoding the location to the centroid of the corresponding ZIP code. These ZIP centroid-based points were excluded from the analysis, as they could not be reliably matched to a specific parcel and therefore could not be used to determine whether they were located in structures affected by the fire.

A small number of records with valid addresses and reasonable geocoded coordinates still did not fall within any parcel boundary. Upon visual inspection, many of these were located just outside parcel lines. To address this, we applied a spatial join using a 30-foot buffer around each parcel, which successfully linked several additional businesses. No records were joined to more than one parcel, as expected.

For a final set of unmatched records, we used Google Maps to manually verify and update their location coordinates. This refinement step allowed us to improve the accuracy of parcel matching and ensure better alignment between geocoded points and ground conditions.

Assessment of Business Location and Fire Damage

To evaluate whether a business was physically located within the fire perimeter and the extent of structural damage, we conducted a spatial analysis using CAL FIRE's Damage Inspection (DINS) data for structures and Los Angeles County Assessor parcel data.

Structure Damage Classification

In this analysis, we focus only on habitable structures, excluding uninhabitable buildings such as those designated as "Utility Misc Structure" in the DINS dataset. Habitable structures include a range of building types, such as single-family residences, multi-family housing, mobile homes, commercial buildings, and schools.

The DINS dataset also classifies each assessed structure by damage level, ranging from "No Damage" to "Destroyed" (over 50% damage), with intermediate categories

such as “Minor” (10–25%) and “Major” (26–50%). Structures that cannot be assessed are marked as “Inaccessible.”

Spatial Join Methodology

We first spatially joined each DINS-recorded structure to the official fire perimeter to determine whether it fell within the burn area. We then performed a second spatial join to associate each structure with its corresponding parcel, based on County Assessor data as of December 1, 2024. This allowed us to classify the land use type (e.g., residential, commercial, government) of each damaged property.

Handling Parcels with Multiple Structures and Final Damage Classification

In cases where a parcel contained multiple structures with varying damage levels, we calculated an average damage score based on representative values for each structure’s damage category. For example, for the “Minor” category (10–25%), we assigned a midpoint value of 17.5%. For the “Destroyed” category (>50%), we assume a range of 51–100% and use 75% as the midpoint for calculation purposes. If a parcel had one “Minor” structure and one “Destroyed” structure, the average damage was calculated as $(17.5 + 75) / 2 = 46.25\%$.

Based on the calculated or assigned damage percentage, we categorized each parcel into one of three final damage classification for analysis: **Unaffected** (0% damage), **Partially Damaged** (1–49% damage), or **Destroyed** (50% or more damage). We then linked these parcel-level damage classifications to business records using the Assessor’s Parcel Number (AIN), which had been previously assigned during the geocoding and parcel join process.

Short-Term Business Impacts Six Months After the Fires

To assess the short-term impacts of the January 2025 wildfires on businesses, we examined two complementary indicators of disruption in Altadena (ZIP 91001) and Pacific Palisades (ZIP 90272). The first is whether businesses “exited” or were delisted from commercial business listings in the six months following the fires. Delisting does not always indicate permanent closure since some establishments may have relocated or temporarily suspended operations, but it provides an early signal of potential business loss. To capture these dynamics more fully, we again drew on three separate datasets: Data Axle, AtoZ, and Dun & Bradstreet.

The second indicator focuses on parcel sales. Even for businesses that survived the fires, recovery may be jeopardized if the property where they operate changes hands. Using the Los Angeles County Assessor parcel file from August 2025 (six months post-fire), we identified parcels that were sold after January 31, 2025. Sales were determined using the “Recording Date,” which indicates when a property transaction

was officially filed with the county. We then examined how many businesses were located on those parcels. For tenants, such ownership changes can create additional barriers to continuity, whether through displacement, redevelopment, or changes in lease terms.

Together, these analyses provide a preliminary view of the wildfire's economic impacts on the local business base. The findings should be interpreted with caution, however, given differences in dataset coverage and the potential for reporting lags.